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Optimal Control with Aerospace Applications



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Optimal Control with Aerospace Applications James M Longuski, José J. Guzmán, John E. Prussing, 2013-11-04 Want to know not just what makes rockets go up but how to do it optimally Optimal control theory has become such an important field in aerospace engineering that no graduate student or practicing engineer can afford to be without a working knowledge of it This is the first book that begins from scratch to teach the reader the basic principles of the calculus of variations develop the necessary conditions step by step and introduce the elementary computational techniques of optimal control This book with problems and an online solution manual provides the graduate level reader with enough introductory knowledge so that he or she can not only read the literature and study the next level textbook but can also apply the theory to find optimal solutions in practice No more is needed than the usual background of an undergraduate engineering science or mathematics program namely calculus differential equations and numerical integration Although finding optimal solutions for these problems is a complex process involving the calculus of variations the authors carefully lay out step by step the most important theorems and concepts Numerous examples are worked to demonstrate how to apply the theories to everything from classical problems e.g. crossing a river in minimum time to engineering problems e.g. minimum fuel launch of a satellite Throughout the book use is made of the time optimal launch of a satellite into orbit as an important case study with detailed analysis of two examples launch from the Moon and launch from Earth For launching into the field of optimal solutions look no further

Optimization and Approximation Pablo Pedregal, 2017-09-07 This book provides a basic initial resource introducing science and engineering students to the field of optimization It covers three main areas mathematical programming calculus of variations and optimal control highlighting the ideas and concepts and offering insights into the importance of optimality conditions in each area It also systematically presents affordable approximation methods Exercises at various levels have been included to support the learning process

A Variational Approach to Optimal Control of ODEs Pablo Pedregal, 2022-07-26 This self contained book presents in a unified systematic way the basic principles of optimal control governed by ODEs Using a variational perspective the author incorporates important restrictions like constraints for control and state as well as the state system itself into the equivalent variational reformulation of the problem The fundamental issues of existence of optimal solutions optimality conditions and numerical approximation are then examined from this variational viewpoint Inside readers will find a unified approach to all the basic issues of optimal control academic and real world examples testing the book's variational approach and a rigorous treatment stressing ideas and arguments rather than the underlying mathematical formalism A Variational Approach to Optimal Control of ODEs is mainly for applied analysts applied mathematicians and control engineers but will also be helpful to other scientists and engineers who want to understand the basic principles of optimal control governed by ODEs It requires no prerequisites in variational problems or expertise in numerical approximation It can be used for a first course in optimal control

Scientific and

Technical Aerospace Reports ,1991 Space Engineering Giorgio Fasano,János D. Pintér,2016-12-31 This book presents a selection of advanced case studies that cover a substantial range of issues and real world challenges and applications in space engineering Vital mathematical modeling optimization methodologies and numerical solution aspects of each application case study are presented in detail with discussions of a range of advanced model development and solution techniques and tools Space engineering challenges are discussed in the following contexts Advanced Space Vehicle Design Computation of Optimal Low Thrust Transfers Indirect Optimization of Spacecraft Trajectories Resource Constrained Scheduling Packing Problems in Space Design of Complex Interplanetary Trajectories Satellite Constellation Image Acquisition Re entry Test Vehicle Configuration Selection Collision Risk Assessment on Perturbed Orbits Optimal Robust Design of Hybrid Rocket Engines Nonlinear Regression Analysis in Space Engineering Regression Based Sensitivity Analysis and Robust Design Low Thrust Multi Revolution Orbit Transfers Modeling and Optimization of Balance Layout Problems Pilot Induced Oscillations Alleviation Modeling and Optimization of Hybrid Transfers to Near Earth Objects Probabilistic Safety Analysis of the Collision Between Space Debris and Satellite Flatness based Low thrust Trajectory Optimization for Spacecraft Proximity Operations The contributing authors are expert researchers and practitioners in either the space engineering and or in the applied optimization fields Researchers and practitioners working in various applied aspects of space engineering will find this book practical and informative Academics graduate and post graduate students in aerospace engineering applied mathematics operations research optimization and optimal control will find this book useful

Dictionary Catalog of the Department Library United States. Department of the Interior. Library,1969 **Constrained Optimal Controller for Linear Systems with State- and Control-dependent Disturbance** S. Basuthakur,1975

Davidon-Broyden Rank-one Minimization Methods in Hilbert Space with Application to Optimal Control Problems Terry Anthony Straeter,1972 The Davidon Broyden class of rank one quasi Newton minimization method is extended from Euclidean spaces to infinite dimensional real Hilbert spaces The members of this class of minimization methods are distinguished by the manner in which a particular parameter the step size is chosen at each iteration For several techniques of choosing the step size conditions are found which assure convergence of the associated iterates to the location of the minimum of a positive definite quadratic functional For those techniques convergence is achieved without the problem associated with many other first order minimization methods namely the computation of a one dimensional minimum at each iteration The application of this class of minimization methods for the direct computation of the solution of an optimal control problem is outlined The performance of various members of the class are compared by solved by other known gradient methods and the results are compared with those obtained with the rank one quasi Newton methods

International Aerospace Abstracts ,1995 **The 1991 Marshall Space Flight Center Research and Technology** ,1991 *Canadian Aeronautics and Space Journal* ,1984 **Documentation Abstracts** ,1996 **The Chartered**

Mechanical Engineer ,1967 *Government Reports Index* ,1972 *Aeronautical Engineering* ,1993 A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in Scientific and technical aerospace reports STAR and International aerospace abstracts IAA [The Aeronautical Journal](#) ,1995 *Bibliography of Scientific and Industrial Reports* ,1969-03 **U.S. Government Research & Development Reports** ,1969 **USSR Research Reports (unclassified Title) [a Report Bibliography]** Defense Documentation Center (U.S.),1962 **Government Reports Announcements & Index** ,1995

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